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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/115,331	07/14/1998	THOMAS MOSSBERG	EWG-063-C	1260

7590 07/06/2004

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EXAMINER

CHANG, AUDREY Y

ART UNIT PAPER NUMBER

2872

DATE MAILED: 07/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/115,331

Applicant(s)

MOSSBERG ET AL.

Examiner

Audrey Y. Chang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 39-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 39-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 19, 2004 has been entered.
2. This Office Action is in response to applicant's amendment filed on April 19, 2004, which has been entered into the file.
3. By this amendment, the applicant has canceled claims 17-38 and has newly added claims 39-47.
4. Claims 39-47 remain pending in this application.
5. The rejections to claims 17-38 under 35 USC 112, first paragraph, and the objections to claims 17-38 set forth in the previous Office Action are withdrawn in response to applicant's amendment.

### *Response to Amendment*

6. The amendment filed on April 19, 2004 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **the newly added claim 42** recites to include an "active device" that dynamically reprogram each sub-grating. The specification fails to teach such "active device".

Applicant is required to cancel the new matter in the reply to this Office Action.

***Claim Rejections - 35 USC § 112***

7. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

8. Claim 42 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the previous paragraph.

9. **Claims 39-47 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was **not** described in the specification in such a way as to **enable** one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims **fail** to teach how could both *amplitude and the phase parameters*, (i.e. more than two variables) be determined by a *single* function. This is *mathematically impossible*. Also the specification and the claims **fail** to teach how could the amplitudes, which are a function of the complex valued spectral transfer function, as recited in claim 39, be able to control the *spectral transfer function* as recited in claim 41.

It is not clear what is considered to be a “spatial phase” of the sub-gratings. It is also not clear what are considered to be the “amplitude and phase parameters of each sub-grating”, since although the sub-grating may have certain **physical structure to impart phase shift** to an *optical field or light*, it is not clear how could the sub-grating *itself* has amplitude and phase parameters. The specification and the

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claims also fail to teach how to make the sub-gratings with the amplitude and phase amplitude, if it is possible be determined by the equation. The *amplitude* and *phase parameters* seem to be the amplitude and phase parameters of an OUTPUT optical field after being diffracted by the sub-gratings. The claims seem to describe the “phenomena” of an input optical field being *diffracted* by the diffractive grating yet the claims fail to provide “*physical structure*” for the diffractive grating to achieve such “phenomena”. The amplitude, spatial phase shift, and optical phase shift are not well defined as *physical parameters* to define or to even construct the diffractive grating.

The specification and the claims also fail to teach how could “ $A_i$  determines an amplitude of  $a_i$  and  $x_i$  and  $\phi_i$  determine a phase of  $a_i$ ” as recited in claim 39. It seems to be contradiction to the equation recited in claim 39, wherein  $a_i$  is *determined by* the equation with no  $A_i$  and  $\phi_i$ , present in the equation. Also it is not clear what are considered to be the variables and what are the known constants in evaluating the equation.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. **Claims 39-47 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

**Claim 39 is complete confusing and indefinite since it is not clear what is or are the limitations that applicant sought for patent.**

It is not clear what is considered to be a “spatial phase shift” of the sub-gratings. The phase shift is measured with respect to what? It is also not clear what are considered to be the “amplitude and phase parameters of each sub-grating”. An amplitude and phase parameters are generally parts of a *complex*

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*function*. It is not clear what is this complex function with regard to the sub-gratings. It is also not clear what is considered, in physical terms, to be the parameter " $\beta$ ".

The phrase "a spatial Fourier transform applied to the input optical field by an *ith* sub-grating" recited in claim 39 is confusing and **completely wrong**. A sub-grating simply CANNOT apply a Fourier transformation to the input optical field.

The phrase "a complex-value spectral transfer function" recited in claim 39 is confusing and indefinite since it is not clear what is the complex-value spectral function and how does this function relate to? It is not clear what defines or provides such function.

**The claims as stand now are complete confusing and full of errors and indefiniteness. The examiner can only point out a few. It is applicant's RESPONSIBILITY to clarify ALL of the discrepancies, errors and indefiniteness to make the claims in comply with the requirements of 35 USC 112, first and second paragraph. The examiner really cannot make out what limitations are sought for patent.**

**Appropriate correction is required.**

***Claim Rejections - 35 USC § 103***

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. **Claims 39-41 and 44-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Spillman, (PN. 4,985,624).**

Spillman teaches a *multi-period diffractive grating* (20, Figure 1) that is formed on a *common substrate* wherein the diffractive grating comprises a *plurality of sub-gratings* (22 and 24) each have a

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pair of lateral edges and a periodic array of grating lines, serves as the *diffraction elements*, wherein the sub-gratings *are positioned adjacent* to each other with their lateral edges *abutting* to each other at the boundary (26, please see Figure 1 and column 4, lines 3-17).

With regard to claims 40-41, Spillman teaches that the multi-period diffractive grating is applied in an optical apparatus wherein *an input optical field* generated by a *broadband light source* (12) is incident upon it. It is implicitly true that the diffractive grating will diffract the input optical field and which produces a *filtered output optical field*, as shown in Figure 1. A broadband light source implicitly generates an optical field having temporal waveform, (i.e. a standard wave function packet comprises temporal function), which therefore is a function of frequency. The multi-period diffraction grating defines a *complex transfer function* which imparts a filter function including spatial and optical phase shifts and amplitude variation to the input optical field.

With regard to claims 45-47 Spillman teaches that the multi-period grating is a *reflective* grating and it can either be formed on a *planar surface* or a *non-planar surface*, (please see Figures 1 and 2).

This reference has met all the limitations of the claims with the exception that it does not teach explicitly that the amplitude and phase parameters of the sub-grating are defined by the cited mathematic expression. However the phrase "amplitude and phase parameters of sub-grating" is not defined and not enable for the reasons stated above. This feature can only be examined in the broadest interpretation. It is implicitly true that the multi-period grating introduces *phase shift* which is a function of spatial coordinate of the grating and has a spatial amplitude, wherein the characteristics of the grating can be described by the transfer function of the grating, which is in general a function of amplitude and phase shift of the grating imparts on an incident input optical field. Since the transfer function filters the input optical field to create the filtered output field it would have been within the general skill of the art to calculate or determined the characteristics of the grating by using the relationship: input optical field

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times transfer function equals to the output optical field. Such modification therefore would have been obvious to one skilled in the art for determining the characteristics of the grating.

With regard to claim 43, this reference does not teach explicitly that the optical thickness of the sub-grating is controlled by the physical thickness of the sub-grating however such modification is considered to be obvious to one skilled in the art since it is known in the art that an optical thickness is defined by the physical thickness times the refractive index of the medium, it would be more than obvious to one skilled in the art to change the optical thickness by simply varying the physical thickness for the benefit of changing the phase shift value.

With regard to claim 44, this reference also does not teach explicitly that the multi-period grating is of transmissive mode, however to make the grating reflective or transmissive is considered as obvious matters of design choice to one skilled in the art for the benefit of making the grating fitted for different application arrangement.

**14. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Spillman as applied to claim 39 above, and further in view of the patent issued to Yariv (PN. 5,832,148).**

The multi-period diffractive grating taught by Spillman as described for claims 39 above has met all the limitations of the claims. With regard to claim 42, this reference does not teach to include an “active device” that dynamically reprograms the sub-gratings. However the instant application also fails to disclose such in the specification. This feature can therefore only be examined briefly. It is known in the art to use active medium, such as electronically addressable medium, to create diffraction grating, as taught by Yariv, (please see Figure 2) to provide electrical control to the diffractive grating, it would then have been obvious to one skilled in the to replace the grating medium by an electrically adjustable or



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active medium for the benefit of providing a means to adjust and drive the diffractive grating to achieve desired optical properties.

### ***Double Patenting***

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

16. **Claims 39-47 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-2 of U.S. Patent No. 6,314,220.** Although the conflicting claims are not identical, they are not patentably distinct from each other because they both claim a diffractive structure having plurality of sub-grating. It is implicitly true that the equation recited in cited patent is a special case of *utilizing* the diffractive grating with respect to the instant application. In the instant application, the input optical field and output optical field makes non-normal angle with respect to the normal of the diffractive grating as shown in Figure 3C, the optical fields are in air medium, (with refractive index equals 1). In the cited patent, the input and output optical fields propagates in a wave guide (with a refractive index  $n$ ) such that they make a 90 degree angle with respect to the normal of the diffractive grating, this means  $\beta = (\sin\theta_{in} + \sin\theta_{out})/c$  recited in this application is equals to  $2/c$  in the cited patent.

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*Response to Arguments*

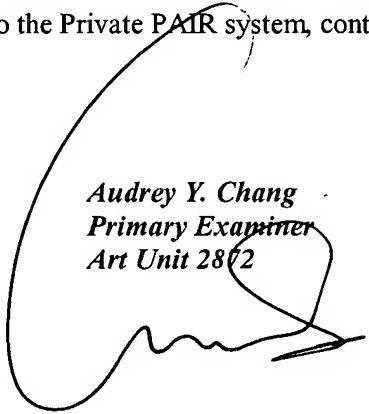
17. Applicant's arguments filed on April 19, 2004 have been fully considered but they are not persuasive. The newly submitted claims have been fully considered and they are rejected for the reasons stated above.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Audrey Y. Chang*  
*Primary Examiner*  
*Art Unit 2872*



A. Chang, Ph.D.